3.3 AIR QUALITY

This section evaluates the effects of timber harvesting on local and regional air quality. The evaluation begins with a discussion of the existing environment including a review of current air quality in the Project Area. This is followed by a brief review of applicable air quality regulations. The discussion of project effects (short- and long-term) focuses on fine particulate matter (PM_{10}) because that is the only pollutant for which Humboldt County is in non-attainment. The section concludes with a discussion of practices that will be used to minimize project effects

3.3.1 Existing Setting

The proposed project is located in Humboldt County, which is part of the North Coast Unified Air Quality Management District (NCUAQMD or the District). The District serves as the lead agency that administers and regulates air quality in Humboldt County. The NCUAQMD also includes Del Norte, Trinity, Mendocino, and Sonoma counties and is bordered by the Pacific Ocean to the west and the coastal range to the east. Humboldt County contains the Redwood National Park Class I area located 50 miles north of Scotia. A Class I area is an area of special national or regional interest from a historic, natural, scenic, or recreational perspective.

The Project Area is characterized by mild, dry summers and cool, wet winters. The average annual precipitation at Scotia is 51 inches, most of which occurs between November and March. The average July maximum temperature at Scotia is 68 degrees Fahrenheit (°F). The average minimum temperature in January is 39 °F.

The mild climate of the region is influenced by winds from the west/north-west. According to data collected by California Air Resources Board (CARB), winds in Humboldt Bay (25 miles northwest of the Project Area) blow from the north or northwest 33 percent of the time with an average speed of 12 mph. As discussed later in this section, the relatively high wind speeds in the region tend to dilute emissions that are released in the county and thus reduce the potential for air pollution.

The project is located in an area zoned for timber production. Existing sources of air pollution in the area include mobile emissions from United States Highway 101 (US 101) and State Route 36 (SR 36); various timber and wood processing companies; and natural sources, such as fugitive dust and biogenic emissions.

3.3.2 Existing Emissions and Prevailing Air Quality

Local and regional air quality is related to the amount and type of emissions as well as their spatial distribution and local meteorological conditions. This section describes the sources of emissions and their relative contribution to overall County emissions. A review of these emissions is followed by discussion of air quality in Humboldt County. An inventory of air emissions for Humboldt county is published by the CARB with input from the local District. The emissions inventory tabulates pollutants (in tons per day) from each source category. It allows us to assess the relative contributions of different source categories to overall emissions.

Table 3.3-1. 1995 Emissions Inventory for Humboldt County
(tons per day)

Source Category	ROG	CO	NOx	SO_2	PM_{10}
Mobile (Highway)	10	120	17	0.9	0.7
Stationary Sources	5.5	9.6	6.0	1.5	1.9
Area Sources	8.4	72	0.7	0.1	19
Natural Sources	0.7	12	0.2	Neg	1.7
Total	25	210	24	2.5	23

ROG = Reactive Organic Gasses (ozone precursor); CO = Carbon Monoxide; NOx = Nitrogen Oxides (ozone precursor); SO_2 = Sulfur Dioxide; PM_{10} = Particulate Matter, less than 10 microns.
Source: 1995 Emissions Inventory, California Air Resources Board, October 1997

Table 3.3-1 lists the most recent (1995) emissions inventory. The primary sources of PM_{10} are area sources such as dust from roads, agriculture, and residential fuel combustion. About one half of PM_{10} (fine particulate matter with an aerodynamic diameter of 10 microns or smaller) of emissions (10 tons per day) in the area source category are from unpaved road dust emissions. Area sources also include emissions from residential wood combustion (3.1 tons per day PM_{10}) and waste burning (2.4 tons per day PM_{10}).

Consistent with the federal Clean Air Act of 1970, the EPA established national ambient (outside) air quality standards. The standards were established for several air pollutants based on specific medical evidence and consist of an averaging time and the numeric concentration. The federal standards are two tiered: primary standards—designed to protect public health; and secondary standards—designed to protect the environment, such as visibility, damage to property, soil, vegetation, etc. Table 3.3-2 lists the air pollutants and the federal ambient air quality standards. Recently, the EPA revised the list of air pollutants to include PM-2.5 to more closely regulate the particle size range responsible for health effects. While the EPA has promulgated standards for PM-2.5, these standards have not been implemented at the state level. Monitoring and inventories are still maintained for PM_{10}. As a rule of thumb, one third of PM_{10} is the PM-2.5 fraction (EPA AP-42 particle size distributions).

The state of California also promulgates ambient air quality standards several of which are more stringent than the federal standards, and include sulfates, hydrogen sulfide, and vinyl chloride. California air quality standards are included in Table 3.3-2. Air quality standards are expressed in terms of concentrations (e.g., parts per million, or micrograms per cubic meter). To determine the air quality of an area meets or exceeds the ambient standards, air monitoring is conducted. Humboldt County attains national ambient air quality standards for all air pollutants. With the exception of PM_{10}, the county attains the California standards. PM_{10} is fine particulate matter less than 10 microns in diameter (0.00039 inch). These fine particles are capable of being inhaled deep into the lung and may introduce substances which can cause chronic health effects.

3.3.3 Threshold of Significance

NCUAQMD has not established emissions thresholds for Humboldt County that determine whether a project or plan will

Table 3.3-2. Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards Concentration[1/]	National Standards[2/] Concentration[3/]
Ozone	1 Hour	0.09 ppm (180 _g/m^3)	0.12 ppm (235 _g/m^3)
Carbon Monoxide	8 Hour	9.0 ppm (10 mg/m^3)	9 ppm (10 mg/m^3)
	1 Hour	20 ppm (23 mg/m^3)	35 ppm (40 mg/m^3)
Nitrogen Dioxide	Annual Average	NA	0.053 ppm (100 _g/m^3)
	1 Hour	0.25 ppm (470 _g/m^3)	NA
Sulfur Dioxide	Annual Average	NA	80 _g/m^3 (0.03 ppm)
	24 Hour	0.04 ppm (105 _g/m^3)	365 _g/m^3 (0.14 ppm)
	1 Hour	0.25 ppm (655 _g/m^3)	NA
Particulate Matter (PM_{10})	Annual Arithmetic Mean	NA	50 _g/m^3
	Annual Geometric Mean	30 _g/m^3	NA
	24 Hour	50 _g/m^3	150 _g/m^3
Sulfates	24 Hour	25 _g/m^3	NA
Lead	Calendar Quarter	NA	1.5 _g/m^3
	30 Day Average	1.5 _g/m^3	NA
Hydrogen Sulfide	1 Hour	0.03 ppm (42 _g/m^3)	NA
Vinyl Chloride (Chloroethene)	24 Hour	0.010 ppm (26 _g/m^3)	NA
Visibility Reducing Particles[4/]	8 Hour (10 a.m. to 6 p.m. PST)	(See Footnote[5/])	NA

ppm = parts per million, mg/m^3 = milligrams per cubic meter, _g/m^3 = micrograms per cubic meter.

1/ California standards for ozone, carbon monoxide (except Lake Tahoe), sulfur dioxide (1-hour and 24-hour), nitrogen dioxide, suspended particulate matter—PM_{10}, and visibility reducing particles are values that are not to be exceeded. The standards for sulfates, Lake Tahoe carbon monoxide, lead, hydrogen sulfide, and vinyl chloride are not to be equaled or exceeded. If the standard is for a 1-hour, 8-hour or 24-hour average (i.e., all standards except for lead and the PM_{10} annual standard), then some measurements may be excluded. In particular, measurements are excluded that the CARB determines would occur less than once per year on the average.

2/ National standards other than for ozone and those based on annual averages or annual arithmetic means are not to be exceeded more than once a year. For example, the ozone standard is attained if, during the most recent three-year period, the average number of days per year with maximum hourly concentrations above the standard is equal to or less than one.

3/ National air quality standards are set at levels determined to be protective of public health with an adequate margin of safety. Each state must attain these standards no later than three years after that state's implementation plan is approved by the EPA.

4/ This standard is intended to limit the frequency and severity of visibility impairment due to regional haze and is equivalent to a 10-mile nominal visual range when relative humidity is less than 70 percent.

5/ In sufficient amount to produce an extinction coefficient of 0.23 per kilometer due to particles when the relative humidity is less than 70 percent.

have a significant air quality effect. Under CEQA and NEPA, a project is considered to have a significant air quality effect if it (1) violates ambient air quality standards; (2) interferes with the attainment of such standards; or (3) results in a substantial increase in emissions over the baseline. A project effect is not considered significant if there is no increase in emissions over the baseline and there is no potential for violation of air quality standards.

3.3.4 Regulatory Requirements

The lead agency administering air quality in Humboldt County is NCUAQMD. The District is mandated under the California Clean Air Act to ensure compliance with ambient air quality standards, and in cases

where such standards are violated, to devise a plan for attaining the standards. Such a plan is referred to as the State Implementation Plan. The District regulates emissions from stationary sources while the state regulates emissions from mobile sources such as cars and trucks. The latter also includes emission standards for heavy construction equipment powered by diesel engines. The EPA adopted ambient standard for PM 2.5 has not been implemented at the state or District level and all current regulatory requirements are presented in terms of PM_{10}.

Open burning is regulated under district Regulation II, Rules 100-500. Emissions from mobile sources are regulated by state and federal requirements that limit tailpipe emissions from mobile sources, including cars, trucks, construction equipment, etc. Fugitive dust emissions are regulated under District Regulation I, Chapter 4, Rule 430.

Federal regulations (40 CFR 93.150) require the federal government to demonstrate that any action taken on or by the federal government conforms to the applicable State Implementation Plan. This plan is designed to bring an area that violates ambient air quality standards into compliance. The transfer of ownership, interest, and titles in land, facilities, and real and personal properties is regulated if such actions result in an increase in air emissions (40 CFR 93.153, [c][2][xiv]).

3.3.5 Air Quality Effects (All Alternatives)

All of the project alternatives would involve harvesting of trees, transporting the trees from the Project Area, and disposing of waste in the mill and by open burning. These activities result in emissions of gaseous and particulate matter. Specifically, timber harvesting includes the following operations: logging and associated transportation, site preparation, slash control by broadcast burning, road construction and maintenance, and sawmill operation.

The air quality effects associated with the timber harvesting can be divided into several distinct categories of emissions:

- Fugitive dust from paved and unpaved roads
- Emissions from road construction, including emissions from gravel mining
- Emissions from slash burning
- Gaseous emissions from fuel combustion

Fugitive dust is generated by vehicle travel on paved and unpaved roadways, grading and site preparation, road construction, and any other activity that disturbs surface soils. Fugitive dust is a source of fine particulate emissions or PM_{10}. Emissions from slash burning result in both PM_{10} and gaseous emissions, although PM_{10} emissions are the most significant effect from burning. Fuel combustion emissions are associated with vehicle operation, heavy construction equipment operation, operation of motorized hand-held equipment (chain saws), and the boiler operations at the sawmills. Fuel combustion results in emissions of gaseous air pollutants, such as CO, SO_2, and NO_X. Boiler and other stationary sources are subject to specific permit requirements of the NCUAQMD to prevent impacting current attainment status. Regionally, the area is in non-attainment for the California state PM_{10} standard and the following discussion focuses on the project potential contribution of that pollutant.

3.3.5.1 Fugitive Dust Emissions from Transportation

Vehicular travel on paved and unpaved roads is a major source of fugitive dust and particulate matter. Particulate from paved roads arises from the road shoulder, or

from dirt on the pavement. Particulate from unpaved roads is from wheel entrainment of the road surface itself. On unpaved roads, fugitive dust emissions increase when moisture is low, silt content is high and vehicle speed is high. Because of the large amount of unpaved logging roads, the unpaved emissions dominate PALCO's emissions inventory, contributing 77 percent of the estimated 3.1 tons per day of fugitive dust baseline emissions.

Fugitive dust emissions are based on estimates of current and future vehicle trips, trip length, and vehicle miles traveled (VMT, see Table 3.12-2). Overall, vehicle travel for each alternative is proportional to the average annual volume of timber harvested. Based on these mileage projections and some general assumptions about vehicle speed, type of road (paved/unpaved), and road silt content, annual PM_{10} emissions were estimated for the first decade. The results are presented in Table 3.3-3. The results show that future emissions would be 10 to 80 percent lower than the base year depending on the alternative. Alternative 2, the proposed project would have some 10 percent lower mobile source fugitive dust emissions because average timber harvest under Alternative 2 is slightly less than historical baseline timber harvest and will require less transportation.

Travel on wet roads generates essentially no dust. Under the aquatic habitat protection plan, truck travel would be sharply restricted in the winter wet season to reduce sedimentation, and hence travel would likely be more concentrated in the drier months of April to September. Greater activity during these months would result in a slight increase in fugitive dust emissions compared with historical year-round activity. This increase would, however, be offset by a reduction in dust emissions resulting from implementation of another aquatic habitat measure, a greater level of gravel road surfacing. Gravel roads have roughly one-third the fugitive dust emissions of plain dirt roads. By the end of the permit period, most of the routinely used unpaved roads would be gravelled and resulting in an appreciable net reduction in particulate emissions.

Fugitive particulate from travel will occur near some residential areas such as Shively, Carlotta, Fortuna, Rohnerville, Freshwater, and Kneeland and recreation areas such as the Humboldt Redwood State Park, Grizzly Creek Redwoods State Park, and Humboldt County Park on the Van Duzen River. Effects to local towns and recreation areas are likely to be minimal because of the periodic/intermittent nature of dust emissions from the occasional passage of a truck. The movement of such trucks may generate localized visible dust such emissions would be temporary, however, and would not contribute to violation of the state 24-hour PM_{10} air quality standards. Except for Kneeland, the residential communities are generally upwind of the PALCO ownership. Dust and other emissions from the project would be transported to the east or southeast and therefore, would not effect these towns.

Diesel trucks contribute PM_{10} from exhaust, but in much lower amounts. With a daily total of 106,000 vmt in the baseline, diesel exhaust PM_{10} is some 0.01 tons per day. The project and alternatives are 5 to 63 percent less.

3.3.5.2 Fugitive Dust Emissions from Road Construction

Road construction involves land clearing, cut and fill operations, truck dumping, and movement of trucks and equipment over unpaved roads. Since road construction would use gravel, there would be emissions from gravel mining on PALCO property. Dust emissions can vary substantially from day to day, depending on the level of activity, the specific operation, and the prevailing meteorological conditions.

Table 3.3-3. Fugitive Dust Emissions from Vehicle Travel on Paved and Unpaved Roads

Alternative	Base	1	2	2a	3	4
Average Daily Miles Traveled on Paved Roads	95,373	68,582	85,810	84,757	17,030	62,247
Average Daily Miles Traveled on Unpaved Roads	10,410	7,175	8,733	9,555	2,844	7,007
Average Daily Emissions (tons/day) from Travel on Paved Roads[1/]	0.7	0.5	0.7	0.7	0.2	0.5
Average Daily Emissions (tons/day) from Travel on Unpaved Roads[2/]	2.4	1.6	2.3	2.2	1.4	1.9
Comparison with Base Year (tons/day)	-	1.0	0.1	-0.2	1.5	-0.7

[1/] PM_{10} emission factors of 0.0151 lb./VMT from AP-42, Chapter 13, Section 2.1 (k=0.016, sL= 0.4, W=12 tons), with reduction from number of days with measurable precipitation (119) and residual moisture on roads (50% reduction).

[2/] PM_{10} emission factor of 0.459 lb./VMT from AP-42, 13, 2.2 (k=0.36, s= 5.0, W=12 tons, S=35 mph, w=15.6, p=119).

Source: Foster Wheeler Environmental Corporation

The amount of dust emissions is proportional to the area of land and the level of construction activity. It is estimated that over the 50-year life of the permit, 400 miles of new roads would be constructed and about 50 miles of existing roads would be gravelled or otherwise stormproofed annually. Currently, there are no reliable means of estimating emissions from road construction. However, emissions would be temporary and occur in relatively small, isolated portions of the Project Area. In the aggregate, construction emissions would be offset by the two-thirds reduction in travel emissions from gravel roads as compared to emissions from unpaved roads. Particulate emissions offset by use of gravel roads would progressively increase during the course of the project because a greater amount of vehicle miles would be over gravel roads. As a result, emissions from road construction are not considered significant.

3.3.5.3 Emissions from Broadcast/Slash Burning

Timber harvesting generates unmerchantable tree branches, leaves, and bark as waste material. This material may be burned on the ground (broadcast burning) or the waste may be gathered into piles and burned several times a year, usually in spring or fall when forest fire danger is low. The waste material may be gathered and stored in piles where it is burned. Depending on the age of the area being harvested, the amount of waste generated can vary between 10 tons/acre for young growth to 70 tons/acre for old growth areas. (Personal communication, Mark Rodgers, PALCO, September 14, 1998).

Use of controlled fires for waste disposal creates smoke (particulate matter), carbon monoxide (CO), and reactive hydrocarbons (ROG). In comparison to these pollutants, relatively minor amounts of sulfur dioxide and oxides of nitrogen are produced. Table 3.3-4 lists annual emissions of PM_{10}, CO

and ROG associated with the proposed project (Alternative 2) and other project alternatives. Accurate figures for historic baseline acreage are not available. For the present analysis, baseline acreage is assumed to be equal to the proposed project, Alternative 2. Although the volume of harvest will decline by 10 percent from historic levels, the area harvested will not be smaller. The baseline includes substantial areas of old growth forest with high timber yield per acre. The shifting of harvest from old growth areas will result in an area similar to the historic baseline. Slash burning will occur only on "burn days" approved by the CARB. Burning will be limited to these days only to ensure that effects to local air quality would be minimized. In addition, PALCO is a member of Smoke Management Plan, a cooperative among timber companies, NCUAQMD, and CARB.

The goal of this cooperative is to minimize the effect of smoke on nearby communities. This cooperative also gathers local meteorological data for transmission to CARB. In turn, CARB uses these data to refine their burn/no-burn days. Aided with this information, PALCO will select burn days when smoke dispersal will be optimum. No burning will take place on days when surface inversions are forecast or when the burn area is in proximity to sensitive areas.

The proposed project is considered equal to baseline conditions and would not result in an increase in emissions.

3.3.5.4 Indirect Effects

The indirect consequences to the regional air quality are difficult to identify or quantify. However, the potential indirect consequences to the regional air quality associated with all of the alternatives, excluding Alternative 1, include vehicle emissions associated with travel to newly created recreational areas, increased timber harvesting activities, a potential increase in saw mill activity, and vehicle emissions associated with increased habitat monitoring activities. It is unlikely that the emissions associated with these activities are significant in and of themselves, but they are additive to the direct air effects.

3.3.5.5 Cumulative Effects

Since the proposed project and the alternatives would result in a reduction in air emissions, the project would have a positive, beneficial effect on air quality. Since there would not be an increase in air emissions, the proposed project would also be consistent with the SYP for PM_{10}.

3.3.5.6 Significance of Effects

Timber harvest activities have the potential for localized, short-term effects associated with vehicular movement or waste burning, but based on the temporary and geographically dispersed nature of emissions from the various alternatives, it is reasonable to conclude that ambient air quality standards would not be violated nor would such emissions interfere with the attainment of ambient standards. As an aggregate, PM_{10} emissions would decline for the project and more so for the alternatives.

3.3.6 Mitigation

The following methods will be employed to reduce emissions although these steps are considered good forest management practices and are not required to mitigate a cumulative significant effect.

- Suppress dust on haul roads and lay-down areas
- Limit vehicle and equipment idle times
- Perform manufacturers recommended preventive maintenance on vehicles
- Conduct prescribed burns with dry materials consistent with fire safety requirements

Table 3.3-4. Annual Emissions from Slash/Broadcast Burning (tons per year)

Alternative	Base	1	2	2a	3	4
PM_{10}	12.2	9.26	12.2	11.6	1.59	8.72
CO	305	231	305	291	39.8	218
ROG	9.41	7.13	9.41	8.96	1.23	6.71
Comparison with Base Year (percent change)	0	-24	0	-5	-87	-29

Basis: 35 tons/acre of waste generated. Emission factors from AP-42 Table 13.1-3, 1995.

Alternative 2a does not include emissions from harvest on SPI lands excluded from Headwaters purchase agreement, but presumably the owner of these lands would harvest there and the cumulative emissions would be essentially equal to Alternative 2.

Source: Foster Wheeler Environmental Corporation

- Limit vehicle speeds on unpaved roadways to limit fugitive dust
- Prioritize road stormproofing and graveling according to intensity of travel.

In order to reduce emissions from slash burning and to reduce the effects of smoke, PALCO participates in a cooperative program with the NCUAQMD, CDF, and other landowners to reduce the effects of smoke (PALCO, 1998, Volume I, Page 39). PALCO actively participates in meteorological data gathering and transmittal of such data to CARB and NCUAQMD.